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that the shore-birds were not exterminated long ago." He would stop spring shooting and close our markets to the sale of game. We wish that the 'great brotherhood of sportsmen' would agree to this. Their attempt to pose as 'lovers of bird life,' as ornithologists, or as 'Roosevelt-like' is unsuccessful; and if our author really desires to "work loyally in an effort to save our wild life from the extermination which threatens," will he continue to destroy it?

F. T. LEWIS.

Game Laws for 1907.—*Farmers' Bulletin 308* of the U. S. Dept. of Agriculture presents a summary of the game laws of the United States and Canadian Provinces. In the number of bills introduced and in the general demand for change of some sort the record of 1907 is second to that of no previous year, although the number of bills actually passed was equaled by the legislation of 1905. Most of the changes were made to secure greater protection. In several states the seasons were closed entirely for certain kinds of game. On the other hand in many places certain restrictions were removed. The legislation is said to be in a transition stage; settled policies have not been determined but various compromises are made between the sportsmen, the ornithologists' unions, and the majority of people with whom such legislation is by no means an issue. Thus these laws are arbitrary, complex, and difficult of enforcement. Hunting is prohibited in some Maryland counties on election day; water-fowl are protected on Mondays in Ohio. A Maine license which requires \$5.00 ordinarily for the shipment of a moose, etc., permits shipment to a hospital. Alaska allows the sportsman 25 shore birds a day, whereas Maine permits 15 ducks and 70 sandpipers. Such whimsical laws cannot be permanent, and the study of the situation now being conducted should lead to their improvement. Many measures, last year, were allowed to fail rather than pass in an unsatisfactory form.

F. T. LEWIS.

Notes on the Structure of Insects.—*The Ovaries of the Hemiptera.*—In a recent review the writer referred to the two opposing views regarding the development of the sex-cells in the ovaries of insects. As is well known, each ovary consists of a variable number of egg-tubes opening into the oviduct. Each tube is divided into three zones: 1st, the *terminal filament* which, uniting with those from neighboring tubes, forms the suspensorium of the organ; 2nd, the *terminal chamber* and, 3rd, the *germarium* or chambered egg-tube.

According to the more generally accepted view the terminal chamber contains the undifferentiated elements from which are derived not only the eggs but the nutritive cells and the cells of the follicular epithelium which surrounds the developing eggs. Korschelt, who is widely quoted, formerly believed that these elements might be traced back still further to indifferent elements of the terminal filament.

Sharply opposed is the view that the sex-cell is *sui generis*, in origin entirely distinct from the surrounding epithelium. This interpretation has been gaining ground but is opposed by Marshall's recent results.

In view of the conflicting conclusions of previous investigators the recent work of Köhler¹ is of much interest. The fact that the work was done under Professor Korschelt's supervision adds especial weight to the author's conclusions.

The contradictory results obtained by previous workers are due mainly to the use of mature specimens, and to poor technique (staining, fixation, or to thickness of sections). Köhler has studied sixteen species of Hemiptera, of most of which he had immature as well as mature stages. Of three species he had a series of the nymphal stages. Fixation was by means of Hermann's or Zenker's fluids, as alcohol or the much-used corrosive sublimate were wholly unreliable.

It was found that the cells of the peritoneal epithelium, the terminal filament, the epithelium of the germarium and of the follicles, are of common origin. These somatic cells are perfectly distinct from the sex-cells and the nutritive cells which are derived from the latter. The germarium is filled exclusively by the germ cells and is always sharply set off from the terminal filament, usually by a distinct membrane. There are no "free nuclei" present.

Köhler's investigation was not confined to the question of the origin of the cells but included a thorough study of the histological structure of the ovaries, and an especial consideration of cell-division. He found that cell-division takes place in the peritoneal epithelium, terminal filament, egg-tube, and germarium and is always by mitosis. On the other hand the so-called amitotic division occurring in the follicular epithelium is confined to the nucleus and never leads to cell-division. However, the tissue in which it occurs is not senile, but living, and capable of growth and activity. Only after the nuclear divisions have occurred begins the cell activity (secretion of egg-chorion)

¹ Köhler, A. Untersuchungen über das Ovarium der Hemipteren. Zeitschr. v. Zool. 1907, lxxxvii, pp. 337-381, pls. 19-20.

which leads to a wearing out of the tissues. Thus the so-called amitosis is not concerned with cell-increase but leads to increase in surface area of the nucleus, the center of cell-activity.

The origin of the adipose tissue of the adult fly.— In most insects the larval adipose tissue persists in the imago, presenting at most slight modifications. In the higher Diptera, however, and especially in the Muscidae, it has been found that the larval fat-tissue disappears completely and is replaced in the adult by a new tissue. This Berlese thought to be derived from the nuclei of larval muscles, while Henneguy regarded it as made up of metamorphosed leucocytes.

Perez,¹ '07, describes a condition much more in harmony with what is known concerning the origin of other adult organs and tissues. According to this investigator the fatty tissue of the adult originates from subhypodermal groups of small, compact, mesenchymatous cells which, like all young cells, stain readily in haematoxylin. These groups are thus the homologues of the imaginal disks.

The influence of nutrition on reproduction in a spider.— Lecaillon,¹ '07, finds that the conditions of nutrition strikingly influence egg production in a common spider, *Agelena labyrinthica*. Ordinarily this species constructs a single cocoon, containing from 50–100 eggs. Occasionally double cocoons are to be found, one capsule containing a much smaller number of eggs. By overfeeding, Lecaillon obtained from one female five cocoons in as many weeks. Four of these contained respectively 78, 38, 14, and 5 eggs while the fifth cocoon was small, irregular and empty.

W. A. RILEY.

Notes.— The so-called double heart of the mollusk *Arca* has been made the subject of special investigation by A. Theiler (*Jena. Zeitschr. f. Naturwiss.*, Bd. 42, pp. 115–142, Taf. 9–10). The author points out that it is only proper to speak of a double heart where each ventricle has a separate aorta and acts independently of its fellow. Such a condition occurs in *Arca noae*, *A. barbata*, *A. tetragona*, and *A. lactea*. In *A. lactea*, however, there is a common pericardium for both ventricles.

¹ Perez, Ch. Origine du tissu adipeux imaginal chez les Muscides. C. R. Soc. Biol. 1907, lxiii, pp. 137–139.

¹ Lecaillon, A. Influence de la nutrition sur la reproduction d'*Agelena labyrinthica* Cl. C. R. Soc. Biol. 1907, lxii, pp. 334–337.